CM9760-PEX
Port Expander

Installation/
Operation Manual

C546M (8/98)

CONTENTS

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REVISION HISTORY

Manual #	Date	Comments
C546M	8/98	Original version.

1.1 IMPORTANT SAFEGUARDS AND WARNINGS

Prior to installation and use of this product, the following WARNINGS should be observed.

1. Installation and servicing should only be done by qualified service personnel and conform to all local codes.

2. Only use replacement parts recommended by Pelco.

3. After replacement/repair of this unit's electrical components, conduct a resistance measurement between line and exposed parts to verify the exposed parts have not been connected to line circuitry.

The product and/or manual may bear the following marks:

This symbol indicates that dangerous voltage constituting a risk of electric shock is present within this unit.

This symbol indicates that there are important operating and maintenance instructions in the literature accompanying this unit.

	CAUTION: RISK OF ELECTRIC SHOCK. DO NOT OPEN.	
CAUTION: TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT REMOVE COVER. NO USER- SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.		
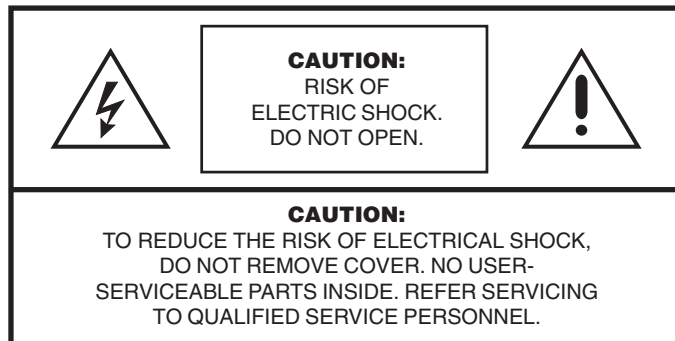
Please thoroughly familiarize yourself with the information in this manual prior to installation and operation.

2.0 DESCRIPTION

NOTE: *Each expansion card and it associated eight ports can have, at most, one device type at a time connected to any one or all eight ports; that is connection of two or more device types on one card is not permitted.*

The Pelco CM9760-PEX (Port Expander) is designed to increase the number of devices that can be connected to a CM9760-CC1, using additional serial communication channels to increase port density.

Currently the CM9760-PEX supports:
1.   Pelco Camera Receiver/Drivers

2.   Pelco Keyboards

3.   Multiplexers

Pictured in Figure 1 is a rear view of a fully populated CM9760-PEX. As indicated by the rear panel subdivisions, the Pelco port expander can be configured with up to five port expander cards. Each input port (1-5) is associated with a correspondingly numbered expansion card in the illustration below.

Each port expander card, in turn, is designed to expand any available RS-422, RJ-45 COMM port located on the rear of the CM9760-CC1 from one to eight RS-422 ports on the rear of the CM9760-PEX.

Each of the eight ports that are part of the expansion, have the same functionality as that of the original port on the rear of the CC1. Of course, a few new rules regarding port grouping need to be obeyed (for example, refer to the margin note).

Any one of the eight ports associated with any installed expansion card can accommodate:

1.   Up to 16 camera receiver/drivers (up to 128 per port expansion card).

2.   One CM9760-KBD (up to eight per port expansion card).

3.   One Multiplexer (up to eight per port expansion card).
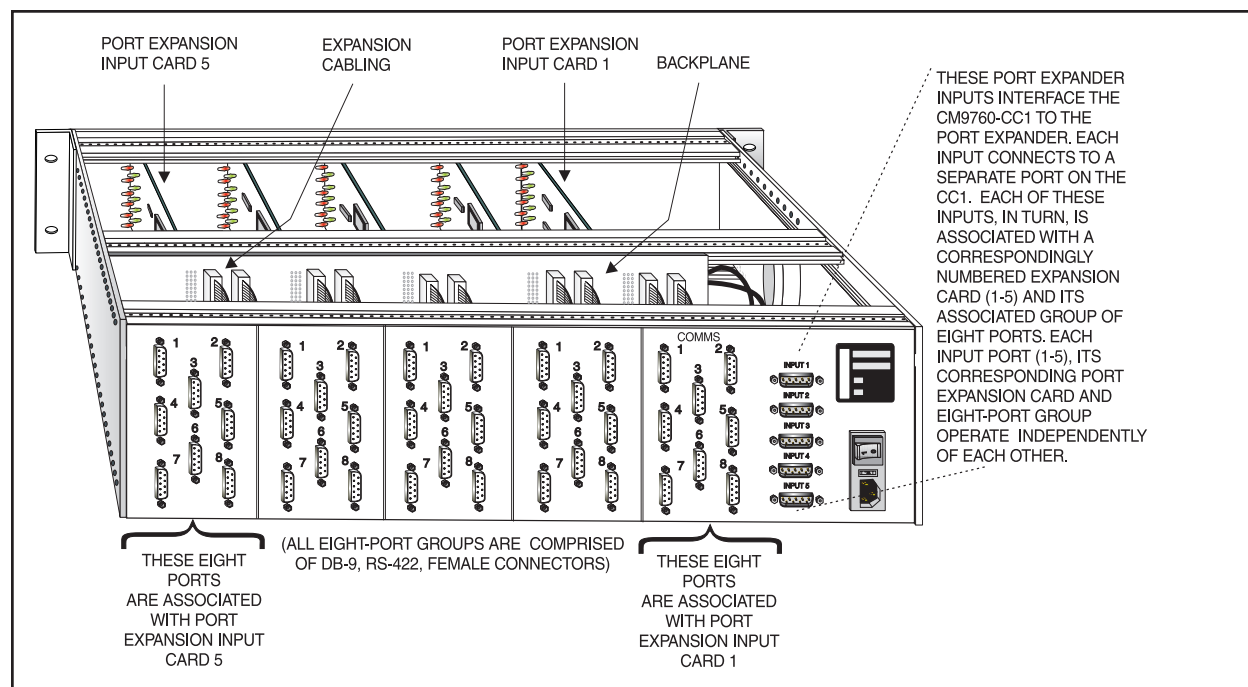
Figure 1. Fully Populated CM9760-PEX (Port Expander) Rear View.

2.1 MODELS

CM9760-PEX   A port expander card cage capable of containing up to five port expansion cards. Each installed card assembly expands one COMM port on the rear of the CM9760-CC1 from one to eight ports.

2.2 OPTIONS

CM9760-PEX-CRD The basic building block of the CM9760-PEX, consisting of a port expansion card, its eight associated ports and supporting cable assembly used for populating the CM9760-PEX with up to five expansion card units.

3.0 INSTALLATION

3.1 HARDWARE

3.1.1 Card Expansion Installation

Each port expander card has its own microprocessor and power regulator. No communication exists between port expander cards.

Cards are installed from the front of the unit after the quick-disconnect screws which hold the front panel in place are loosened (refer to Figure 2).

Cards can be installed into any free slot in the CM9760-PEX Port Expander; that is, there is no set position where the first card must be installed. The five *Input Ports* located on the right rear of the unit, however, are associated with specific physical card expansion positions as indicated in Figure 1.
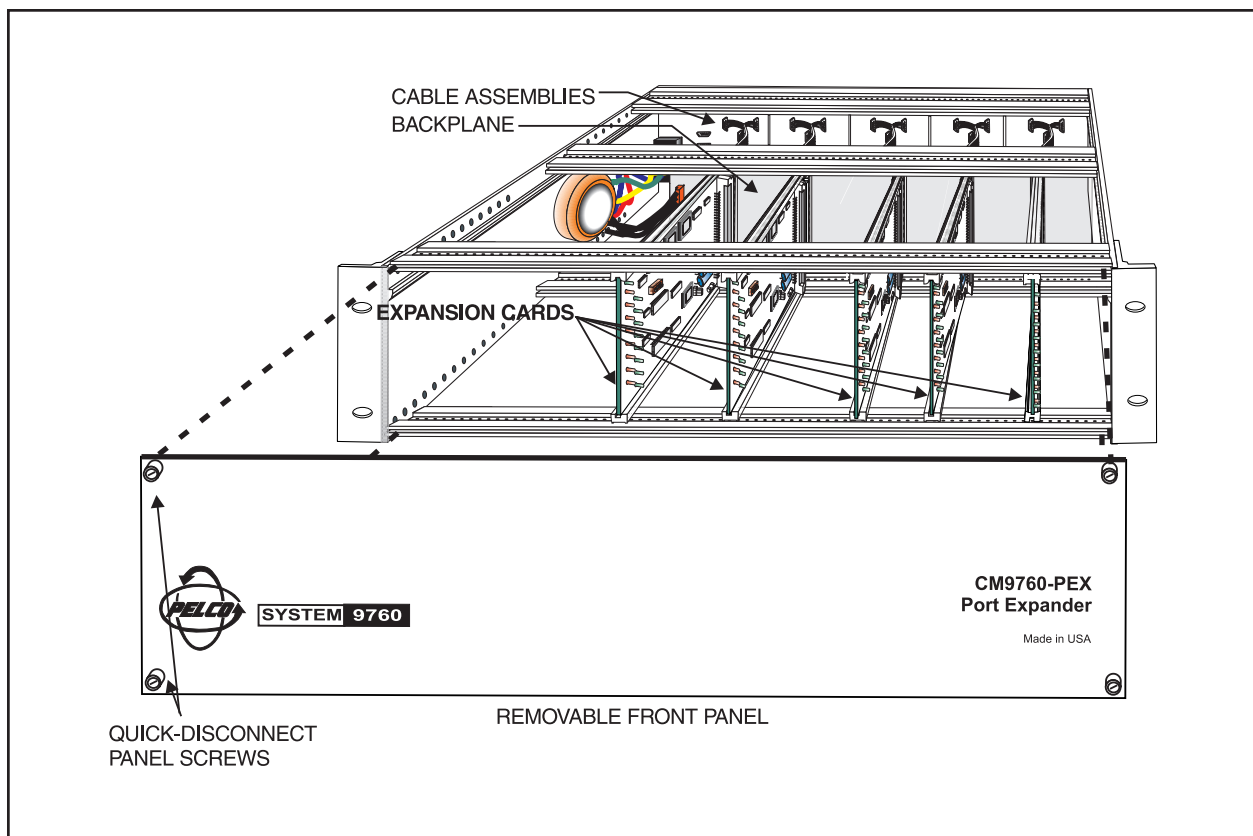
Figure 2. CM9760-PEX Front View with Card Installation

3.1.2 DIP Switch Settings

Each port expansion card, before being installed into the CM9760-PEX card cage should be properly configured with respect to DIP switch settings. The switch setting positions configure communication attributes as well as condition the PEX for the device type connected to each expansion card. These choices are illustrated in Figure 3.

3.1.3 Device Connections

Each CM960-PEX Port Expander card (Input 1 through Input 5) on the right rear of the PEX card cage must be connected to a separate RS-422 COMM port located on the rear of the CM9760-CC1. The port on the CC1 is configured for eight data bits, one stop bit and even parity. Baud rates are chosen according to the parameters spelled out in Figure 3.

The connection details for devices connected to the port expander are detailed in the next few sections.
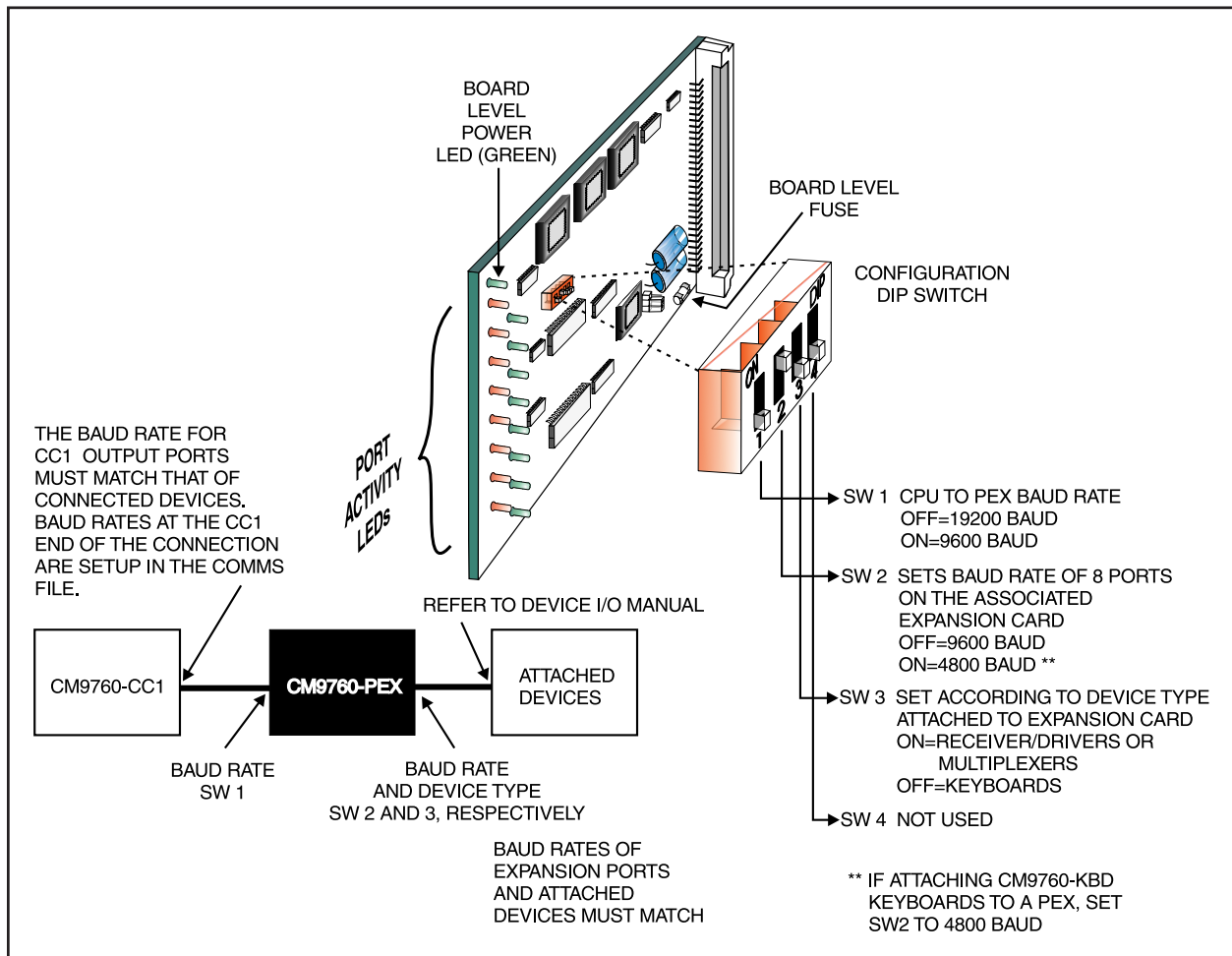
Figure 3. Expansion Card DIP Switch Configuration

3.1.3.1 Connection Between a CM9760-PEX and a CM9760-CC1

The connection of a CM9760-PEX and a CM9760-CC1 is illustrated in Figure 4. Every Port Expander card input port requires a separate connection to a comm port (RJ-45) on the CM9760-CC1.

3.1.3.2 Connection Between a CM9760-PEX and Pelco Receiver/Drivers

The connection of a camera receiver/driver to a comms port on the CM9760-PEX is illustrated in Figure 5. Up to 16 of the same type of camera receiver/drivers can be connected to one comms port on the CM9760-PEX.

NOTE: *DO NOT* *connect a mixture of different receiver/driver types to the same CM9760-PEX Port Expander card.*

NOTE: *The connection devices and/or ports used in the illustrations that accompany the next few sections are those of the ports located on the device itself, rather than those located at either end of the connecting cable.*

Figure 4. Pin Connections Between a CM9760-PEX and CM9760-CC1
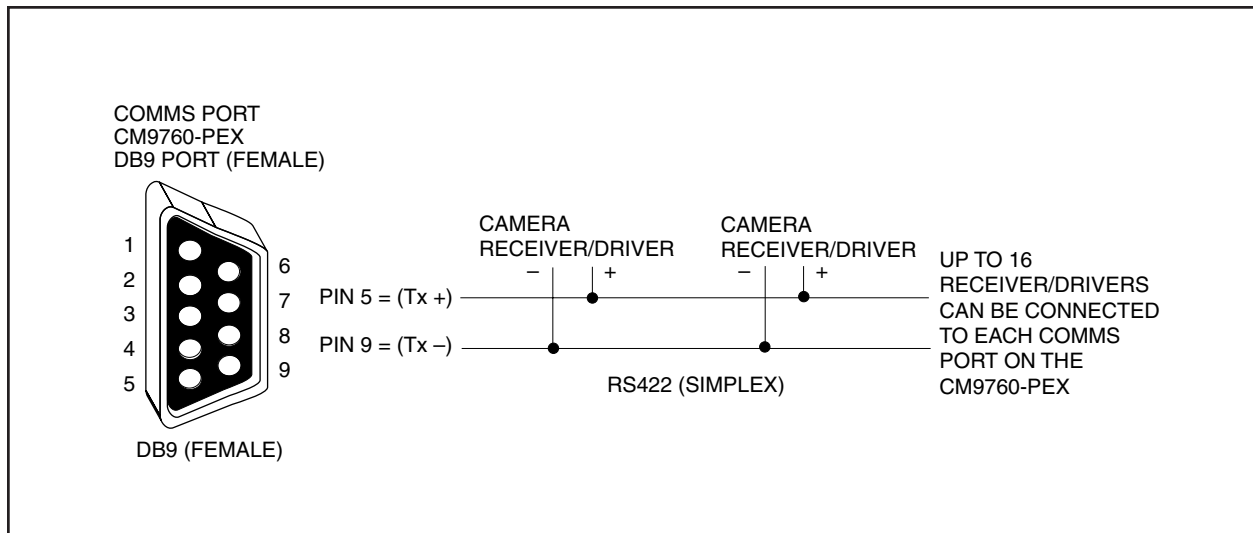
Figure 5. Pin Connections Between a CM9760-PEX and Pelco Receiver/Drivers

3.1.3.3 Connection Between a CM9760-PEX and Multiplexers

The connection of a Multiplexer to a CM9760-PEX is illustrated in Figure 6. One Multiplexer can be connected to each comms port on a Port Expander card (up to eight Multiplexers per card).

3.1.3.4 Connection Between a CM9760-PEX and Pelco Keyboards

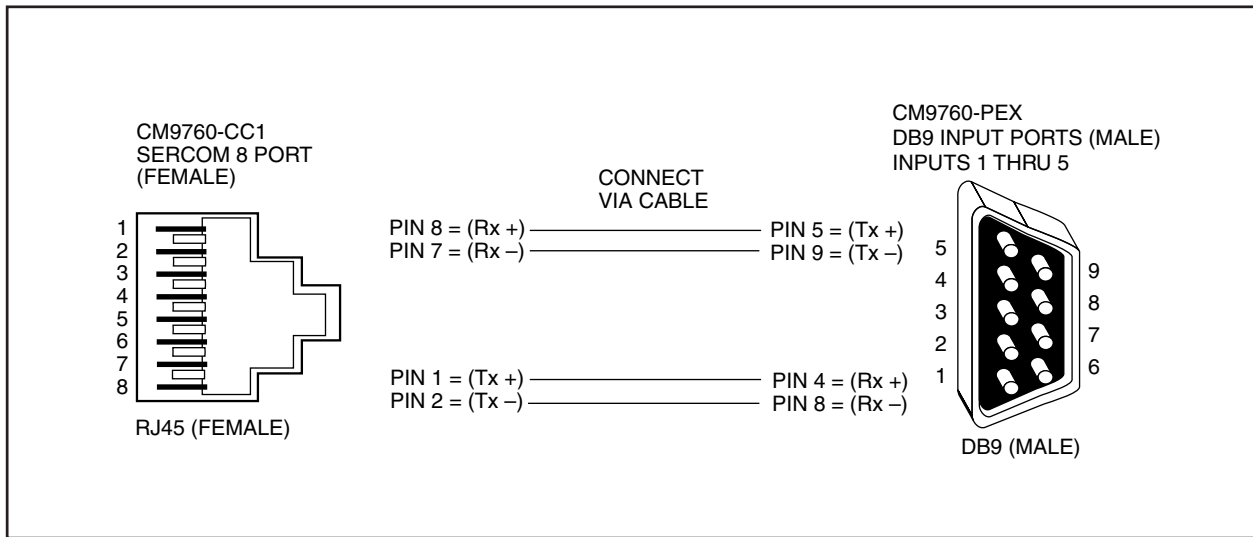The connection of a CM9760-KBD to a CM9760-PEX is illustrated in Figure 7. One keyboard can be connected to each comms port on a Port Expander card (up to eight CM9760-KBDs per card).

COMMS PORT
CM9760-PEX
DB9 PORT (FEMALE)

DATA PORT IN
RJ-45 (FEMALE)**

PIN 4 = (Rx +) ——————————— PIN 1 = (Tx +)
PIN 8 = (Rx −) ——————————— PIN 2 = (Tx −)
PIN 5 = (Tx +) ——————————— PIN 8 = (Rx +)
PIN 9 = (Tx −) ——————————— PIN 7 = (Rx −)

RS-422 COMMS

DB9 (FEMALE)

RJ-45 (FEMALE)

**PINOUT EXAMPLE USED IS FOR THE MX4000 GENEX™ MULTIPLEXER.
CONSULT MANUFACTURE'S DOCUMENTATION FOR OTHER MULTIPLEXERS.
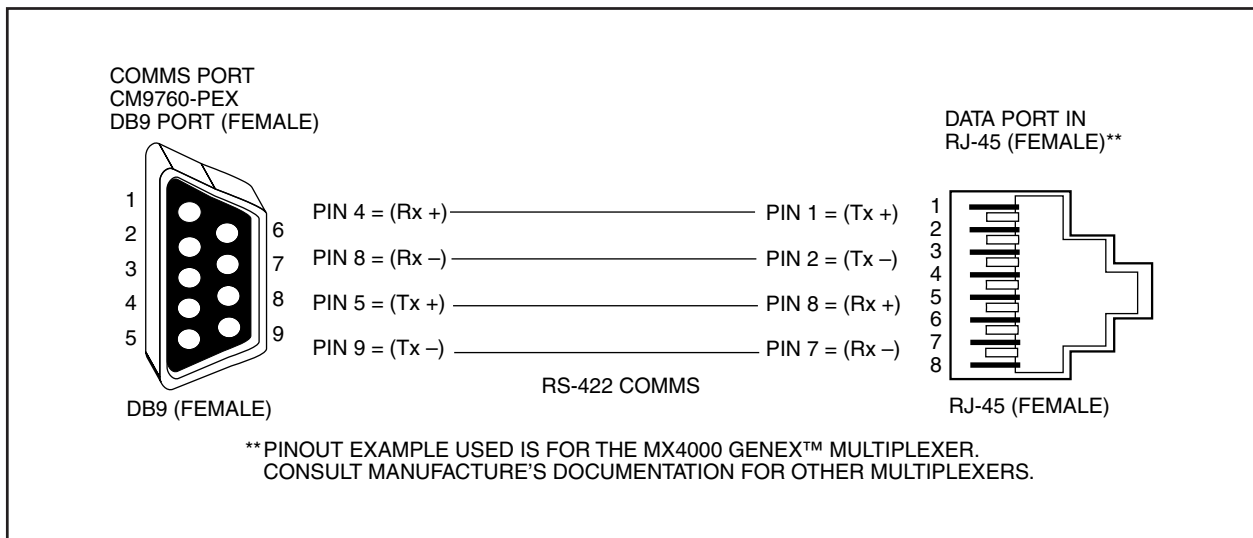
Figure 6. Pin Connections Between a CM9760-PEX and a Multiplexer

COMMS PORT
CM9760-PEX
DB9 PORT (FEMALE)

CM9760-CC1
SERCOM 8 PORT
(FEMALE)

PIN 4 = (Rx +) ——————— PIN 1 = (Tx +)
PIN 8 = (Rx −) ——————— PIN 2 = (Tx −)
PIN 5 = (Tx +) ——————— PIN 8 = (Rx +)
PIN 9 = (Tx −) ——————— PIN 7 = (Rx −)

DB9 (FEMALE)

RJ-45 (FEMALE)
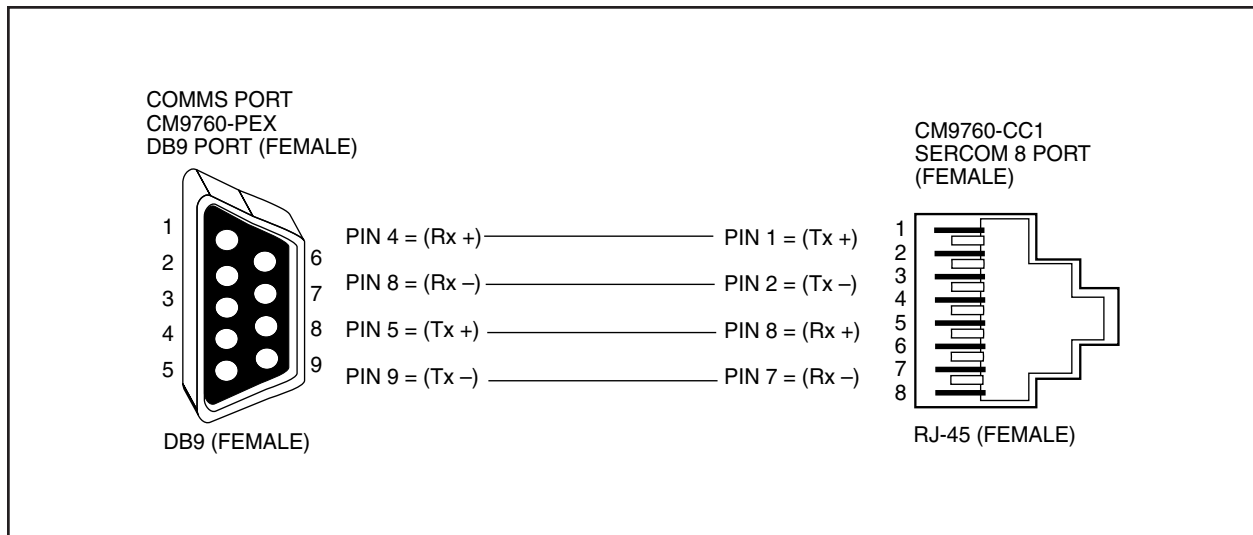
Figure 7. Pin Connections Between a CM9760-PEX and CM9760-KBD

3.1.4 System Illustration

Figure 8 illustrates a port expander included in a hypothetical CM9760 system setup.

CM9760-CC1 (CPU)

BLANK PLATES FOR
UNINSTALLED PORTS

CM9760-PEX
PORT EXPANSION UNIT

COMMS

INPUT 1
INPUT 2
INPUT 3
INPUT 4
INPUT 5

ADDITIONAL EXPANSION
CARDS MUST BE INSTALLED
TO EXPAND BEYOND THE
CONFIGURATION SHOWN

1st CAMERA
RECEIVER/DRIVER

16TH CAMERA
RECEIVER/DRIVER

16 per PORT
128 per EXPANSION
CARD

1 MULTIPLEXOR per PORT; 8 per EXPANSION CARD

1 KEYBOARD per PORT; 8 per EXPANSION CARD

Figure 8. Example of Port Expander as Part of CM9760 System

3.2 SOFTWARE

3.2.1 Address Details

Normally, up to 16 camera receiver/drivers can be connected to one SerCom 8 port on a CM9760-CC1; however, up to 128 camera receiver/drivers can be connected to the same port through expansion by using a Port Expander. Camera receiver/drivers are numbered from 1 to 16. To uniquely identify each camera receiver/driver connected via a Port Expander Card, the receiver/driver must be numbered from 1 to 128.

Up to 16 camera receiver/drivers can be connected to each port on the CM9760-CC1. These receiver/drivers are addressed as per normal; that is, from 1 to 16 (refer to the appropriate receiver/driver manual for instructions on setting receiver/driver addresses). The SET9760 program (part of the CM9760-MGR package) is used to number the camera receiver/drivers from 1 to 128. The receiver/driver address and the port on the CM9760-PEX the receiver/driver is connected to is used to uniquely identify each receiver/driver. Table A details how camera receiver/drivers are numbered from 1 to 128. In each instance the receiver address can be computed according to the following formula, if you know the receiver/driver address and the port to which it is connected on the Port Expander.

EXAMPLE: *A camera receiver/driver has an address of 12; It is connected to comm port 7 on the CM9760-PEX.*

The allocated address would be 108 and is computed according to the following formula (you may also use the lookup table in Table C):

$$
\begin{aligned}
\text{Address} &= \text{Receiver/driver address} & &+ [(\text{Comm Port \# - 1}) \quad \text{x 16}] \\
&= \quad\quad 12 & &+ [\ (\ 7 - 1) \quad\quad\quad \text{x 16}] \\
&= \quad\quad 12 & &+ [\quad 6 \quad\quad\quad\quad \text{x 16}] \\
&= \quad\quad 12 & &+ [\ 96\ ] \\
&= \quad\quad 12 & &+\ 96\ = \mathbf{108}
\end{aligned}
$$

Table A. Address Lookup Details

CM9760-PEX - PORT NUMBER (1-8)								
Receiver/Driver Address	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	1	17	33	49	65	81	97	113
2	2	18	34	50	66	82	98	114
3	3	19	35	51	67	83	99	115
4	4	20	36	52	68	84	100	116
5	5	21	37	53	69	85	101	117
6	6	22	38	54	70	86	102	118
7	7	23	39	55	71	87	103	119
8	8	24	40	56	72	88	104	120
9	9	25	41	57	73	89	105	121
10	10	26	42	58	74	90	106	122
11	11	27	43	59	75	91	107	123
12	12	28	44	60	76	92	108	124
13	13	29	45	61	77	93	109	125
14	14	30	46	62	78	94	110	126
15	15	31	47	63	79	95	111	127
16	16	32	48	64	80	96	112	128

3.2.2 Software Considerations

We now expand the previous section (using receiver/drivers as the attached device) to include the configuration of the necessary software files that need to be setup before successful operation of the PEX can be realized.

Two Setup files in the SET9760 program need to be adjusted if a CM9760-PEX is connected to the CM9760-CC1. These files are the Comms (.SCP) and the Camera file (.CAM). Refer to the CM9760-MGR manual for detailed instructions on programming these files. Table A is can be used to find the number allocated to camera receiver/drivers connected to a CM9760-PEX port expander.

Figure 9 illustrates the Comms (.SCP) file where communication parameters for the port that the PEX is connected are configured. Since we know that the device type attached to the expansion card for this port are receiver/drivers, an equipment number is entered to reflect this (refer to the Figure 9).

It is here also that the communication parameters for the port in queston are entered. Remember that the the BAUD rate set here and the BAUD rate for the expansion card utilizing this port must match.

Pre-defined "equipment numbers" are required for all devices attached to any port on the rear of the CC1. A listing of these equipement numbers can be fouund in the CM9760-MGR manual. For our exapmle, an equipment number of 19 is entered. The number 12 references the COMM port designation on the rear of the CC1 to which our port expander is attached and which, in turn, interfaces our receiver/drivers.

Figure 9. Comms Configuration for Receiver/Drivers

Figure 10 illustrates the other file we previously mentioned-the camera (.CAM) file. It is here that address parameters for each attached receiver/driver is uniquely identified. Also note that this file is used to configure multiplexers, if needed. Refer to the "type" pull-down menu through which you scroll to select the device type. In our example, we are using the CAMERA selection.

The numbers 16 and 8 used here correspond directly to Table A's Address Lookup Details mentioned in Section 3.2.1 of the manual. The number 16 is the last receiver/driver address for the device attached to port 8 on the port expander in question.

Note that this file is also used when multiplexors are attached to a port expander. Here, for our example, we choose CAMERA as the "Type" device in the drop-down menu.

Figure 10. Camera File Configuration

4.0 GUIDELINES FOR PORT EXPANDER USE

The following points are listed as Pelco recommended guidelines for port expander use. The reason the port expander exists at all is to extend the current port limit past that physically allowed by the CM9760-CC1. Even though, the 32 port limit imposed by the CC1 is usually sufficient for most system configurations, the advent of extremely large system configurations made the port expander a necessity. That being said, the guidelines are as follows:

1. Do not use a port expander until all or as many as possible of the available sercom ports on the CC1 are used.

2. If it becomes necessary to use a port expander, use the port expander to hook up those pieces of equipment that you have the largest number of.

3. If you have several different equipment types, all of which are candidates for connection to a port expander, then the following – in order of hook-up preference – is recommended by Pelco:

   a. Receiver/drivers

   b. Multiplexers (if necessary)

   c. Keyboards

One should not hesitate to use the port expander to extend port density when more receiver/drivers need to be introduced for system expansion, for this is the primary reason the port expander was created.

One should be less hesitant to attach multiplexers and keyboards as indicated in the "order of preference" hook-up in step 3 above. In particular, one should avoid attaching addressable multiplexers (those capable of being daisy-chained) to a port expander. Not that it could not be done, but that it would be a waste of resources. For keyboards, special programming considerations are required. If you can't avoid using the port expander to attach keyboards, then follow the detailed programming instructions contained in the CM9760-MGR manual.

ELECTRICAL

Input Voltage: 120 VAC or 230 VAC 50/60 Hz. ±10%, selectable

Power   Consumption: 100 VA

Fusing: 2 Amps

COMMUNICATIONS

Data Ports
  Input: DB-9,RS-422 male connectors
               DIP switch selectable baud rate

  Output: DB-9, RX-422 female connectors
               DIP switch selectable baud rate

MECHANICAL

Connectors
  PEX Input: Five, DB-9, RS-422 male connectors per unit

  PEX Output: Eight, DB-9, RS-422 female connectors per expansion card

  Power: 3-wire, #18 AWG

Mounting
  Type: 19-inch (48 cm) rack mount 3 RUs

GENERAL

Dimensions: 5.24" H x 19.02" W x 14.25" D (13.3 cm x 48.3 cm x 36.2 cm)

Operating
Temperature: 32° F to 122° F (0° C to 50° C)

Weight: 13.60 lbs (6.17 kg)

(Design and product specifications subject to change without notice.)

This equipment contains electrical or electronic components that must be recycled properly to comply with Directive 2002/96/EC of the European Union regarding the disposal of waste electrical and electronic equipment (WEEE). Contact your local dealer for procedures for recycling this equipment.

6.0 WARRANTY AND RETURN INFORMATION

WARRANTY

Pelco will repair or replace, without charge, any merchandise proved defective in material or workmanship for a period of one year after the date of shipment.

Exceptions to this warranty are as noted below:

- Five years on FT/FR8000 Series fiber optic products.
- Three years on Genex® Series products (multiplexers, server, and keyboard).
- Three years on Camclosure® and fixed camera models, except the CC3701H-2, CC3701H-2X, CC3751H-2, CC3651H-2X, MC3651H-2, and MC3651H-2X camera models, which have a five-year warranty.
- Two years on standard motorized or fixed focal length lenses.
- Two years on Legacy®, CM6700/CM6800/CM9700 Series matrix, and DF5/DF8 Series fixed dome products.
- Two years on Spectra®, Esprit®, ExSite™, and PS20 scanners, including when used in continuous motion applications.
- Two years on Esprit® and WW5700 Series window wiper (excluding wiper blades).
- Eighteen months on DX Series digital video recorders, NVR300 Series network video recorders, and Endura™ Series distributed network-based video products.
- One year (except video heads) on video cassette recorders (VCRs). Video heads will be covered for a period of six months.
- Six months on all pan and tilts, scanners or preset lenses used in continuous motion applications (that is, preset scan, tour and auto scan modes).

Pelco will warrant all replacement parts and repairs for 90 days from the date of Pelco shipment. All goods requiring warranty repair shall be sent freight prepaid to Pelco, Clovis, California. Repairs made necessary by reason of misuse, alteration, normal wear, or accident are not covered under this warranty.

Pelco assumes no risk and shall be subject to no liability for damages or loss resulting from the specific use or application made of the Products. Pelco's liability for any claim, whether based on breach of contract, negligence, infringement of any rights of any party or product liability, relating to the Products shall not exceed the price paid by the Dealer to Pelco for such Products. In no event will Pelco be liable for any special, incidental or consequential damages (including loss of use, loss of profit and claims of third parties) however caused, whether by the negligence of Pelco or otherwise.

The above warranty provides the Dealer with specific legal rights. The Dealer may also have additional rights, which are subject to variation from state to state.

If a warranty repair is required, the Dealer must contact Pelco at (800) 289-9100 or (559) 292-1981 to obtain a Repair Authorization number (RA), and provide the following information:

1. Model and serial number
2. Date of shipment, P.O. number, Sales Order number, or Pelco invoice number
3. Details of the defect or problem

If there is a dispute regarding the warranty of a product which does not fall under the warranty conditions stated above, please include a written explanation with the product when returned.

Method of return shipment shall be the same or equal to the method by which the item was received by Pelco.

RETURNS

In order to expedite parts returned to the factory for repair or credit, please call the factory at (800) 289-9100 or (559) 292-1981 to obtain an authorization number (CA number if returned for credit, and RA number if returned for repair).

All merchandise returned for credit may be subject to a 20% restocking and refurbishing charge.

Goods returned for repair or credit should be clearly identified with the assigned CA or RA number and freight should be prepaid. Ship to the appropriate address below.

If you are located within the continental U.S., Alaska, Hawaii or Puerto Rico, send goods to:

> Service Department
> Pelco
> 3500 Pelco Way
> Clovis, CA 93612-5699

If you are located outside the continental U.S., Alaska, Hawaii or Puerto Rico and are instructed to return goods to the USA, you may do one of the following:

If the goods are to be sent by a COURIER SERVICE, send the goods to:

> Pelco
> 3500 Pelco Way
> Clovis, CA 93612-5699 USA

If the goods are to be sent by a FREIGHT FORWARDER, send the goods to:

> Pelco c/o Expeditors
> 473 Eccles Avenue
> South San Francisco, CA 94080 USA
> Phone: 650-737-1700
> Fax: 650-737-0933